## THESIS.

## TYPHUS FEVER,

ITS DIAGNOSIS AND CHEMICO-PATHOLOGY.

## ATHESIS

FROM NOTES OF LECTURES BY PROF. J. EMERSON KENT. M.D. SUBMITTED TO THE FACULTY OF THE

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BY

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ITS DIAGNOSIS AND CHEMICO-PATHOLOGY.

De who discourses whom Typhus Fever, will not be expected to develope a series of astounding nor-elties, but he may possibly present some points of interest, which, if not wholly new, at least possess the merit of practical importance.

I shall, as briefly as practicable, describe the general and special charachristics of this yet formidable disease.

SECRETIONS. Jongue, dotted and coated with a thick

white fur and light brown at the centre, near the base. Ikni dry and hot, with occasional moisture. Pulse quick and soft, Unine searty and high colored. Bowels open.

and land, alternate shirings and flushings. Paus in the limbs, with lassitude. - Sharp pains in the epigaetric and abdominal regions, increased by pressure. - Pain in the head with elight weetigo. - Eyes light and watery - Complains of express enemations, CENERAL HISTORY. Appetite poor for some time, losing etength for a week or his:- increasing daily pallor, felt general pyrepia yesterday. Mought he had taken cold:- had taken sweaks, bitter, se. The above, from the notes of my Preceptor, furnishes an ensemble of the general symptoms of the disease, making due allowance for temperament, age, habits of life, employment. to.)

THE TONGUE. The appearance and condition of the Jongue as diagnostics in febrile diseases, cannot be two highly appreciated, and are equally significant of the state of the alimentary canal. He noticed its dotted appearance, a condition

always observable in febrile diseases, and at all times indicative of Fever. It is most marked in children salways found in the prodromic stage of eruptive and continued fever. It may be thus described, - the tips and edges are sed, the papilla are also red; shooting up through a white fur.

DIAGNOSIS BETWEEN THE DOTTED TONGUE AND THE STRAWBERRY TONGUE OF SCARLATINA.

The dotted tengen is almost always confounded with the strawberry tronger of Scarlatina, it may be observed in the communication of Scarlatina, but only in the stage common to all fevers. In the straw terry tenger of Scarlatina, the papella are much more elongated, protonding through a red raw looking mucous minustrane, presenting much the appearance of a ripe, and strawberry, prom which it takes its name. In Scarlatina, this peculiarity is presented at the time the emplion is being determined to the surface: (my presented at the time the emplion is being determined to the surface: (my presented at the time the emplion Scarlatina from the dotted tonger;) hence this distinction is of much practical value.

#### DIAGNOSIS BETWEEN THE DOTTED TONGUE AND THE

RED TONGUE. During the progress of Sy Jehns, the tongue often clears off, looking red and glaged. A careless observer might pronounce it clean and normal, but it is indicative of an highly inflamed state of the mucous membrane of the alimentary canal. This diagnostic in Typhus, is always coincident with suppurations of the agminated glands of the ileuno. It is not peculiar to this disease, being characteristic of the suppuration of any internal organ, and it also forms one of the symptoms of how hectic, the red bongue is also found in idiopathic inflammation of the mucous membrane. - In the early stage of Typhus, ablue hinge is seen under the mucous membrane of the tongue caused by venous congestion; as the disease progresses, this Fint is obscured by the accumulated fur, which also masks the dotted appearance. - It is at first of a dirty, as hero color, gradually becoming brown or black. Where there is great writation of the mucaus membrane of the stomach, the tonque will remain red at its hip and edges.

THE SKIN will be hot and flushed in proportion to the febrile exaltation, sometimes the face and chest are as red as in Scarlatina, but the absence of the minute papilla always seen in that disease will present any error in Mosology. An offensive efflusion is evolved from the surface, to which I shall hereafter refer.

THE PULSE in Typhus is variable and of little value as a diagnoshie of the internal besions: - as a measures of power, in this as in all other diseases, it is invaluable. It may be quick, strong and bounding, more commonly quick, fieble and soft. With increasing debility it becomes accelerated and weaker, ulti-mately tremulous and flustuating, a result induced by subsultus of the heart, proper to the last stage, when the whole muscular apparatus is of the spasmodically affected.

THE BOWELS are but seldom relayed in the commencement

THE BOWELS are but seldom related in the commencement of the disease, but this is an important and useful condition, if not excessive, as a sequelae.

THE URINE. blose attention to this important secretion indi-

cakes the internal lesions, and affords a decided prognosis more readily than is at first sight apparent. admitting the obstacles nal or apparent; that may beset the prosecution of chemical analysis, no one will demy the wast importance of such investigations so intimately connected with a correct and successful practice. By some, awant of him may be urged, by others, a want of scienbefie, chemical knowledge; but such pleas are fictile when, conbrashed with the advantages gained by chemico pathological researches, him may be economized, and chemical proficiency readily attained. The unweared researches of Miller and the philosophical theories of Liebig cannot but impress us with the deep importance of such investigations. The deviations from the normal standard are in Typhus many and marked, in the early stages the Universe of greenish tint, charged with phosphates, near its termination it assumes a dark brown color and the acid is predominant. Before noticing the morbid condition of the Unio, it is peroper to note the

#### ANALYSIS OF HEALTHY URINE.

Water	933.00
Urea	
	30,10
Free Lactic Acid, Lactate of Ammonia, Comazone	De Just authorite
soluble in alcohol extractive matter soluble in Water.	
Lithie acid	1
	1.00
mucus of the Bladder	0.32
Sulphato of Potash	3.41
ABS, FNOF DE, Soda MEN FROM THE	
	3.16
Phosphate "	2.94
Bi phosphate of ammonia.	1.65
Chloride of Sodium	4.45
Munate of annonia.	1.50
Phosphate of Line and Magnesia.	1.00
Silicia Manda, gette.	A section of
	1000.00
athereby rendered more incide lingsmigerespays.	af Mill

THE URINE IN TYPHUS is acrid, scanty, high colored and free from albumen, Urea and the Phosphates are in.

excess vily matter abundant, no excess of Uni acid, it is roided with heat or a cutting sensation; - in the cold stage it is more watery and diminished in quantity: in the hot stage its color is darker, and the Chloride of Silver now throws down a white precipitate, which before it did not. Bergelius supposes this result to be induced by a loss of acid machin; whilst Durer mey asserts that the University acid in fevers: it is invariably so in Typhies.

### ABSENCE OF ALBUMEN FROM THE URINE.

In only a single instance out of numerous experiments, has alluming been found in any considerable quantity in the Unite of Typhus, and then it did not coaquilate, a light pearly opacity alone being apparent, on submitting the rediment to the action of Liquor Potassae, a gelatinous precipitate of a granish tint was evolved; doubtless pus, - Albumen being soluble in Potassae, while muses is thereby rendered more viscid. Braysmeyen says "if the substance examined be britished with its own weight first, and mixed with a saturated solution of Potassae loads, if Pus be

present, a transparent jelly is in a few hours formed, which is not the case if muces only be contained therein." The pus, in the instance adduced was probably a result of inflamma-Sion of the someous membrane of the unnary passages. We shall again refer to this precipitate, in connection with the coloring matter of Urine. During the latter stages of fever, Witrie acid will often precipitate minute portions of albumen, but the amount is too small to demand more than a passing nohier: In the case cited, the lungs were much congested, accompanied with a dry hard skin, but there was neither anarar ca or inflammation of the integument. albumen is present in the Urine in other diseases, particularly in dropsy and also sometimes where no disease of the Lidneys was secognisable either by the symptoms during life, or by postmorteno examination. When anasarca is above the sener, albumen in greater or less quantity is found in the Unine. If during the night, rapid effusion occurs, either into the Chest or abdomen, albumen is either not present or only in very

minute quantity, the same result is found when the upper half of the body perspires freely, on the contrary, when the skin is dry and harsh, albumen is more abundant in the Urine. It may be hence inferred that albumen in the Urine, de pends primarily on disherbances of the functions of the skin, and that its quantity is modified by internal conditions of the serous surfaces; an inference corroborated by the facility with which albumen is secreted under the application of any achoe excitant to the integument. One of the most important, though least observed functions of the skin, is the secretion of albumow and its presentation as Gelatino, for 1st, as belative is not found in the Blood, it must result from the transformation either of albunew or Sibrine, (most probably the former, albuman being the base of all the agotized metamorphoses,) and 2nd, under increased action or suspension of its proper glandular functions, Albumen is achially secreted. Mandl, speaking of the relations between the blood, pus, mucus and the epidermis, says, "their fibrinous globules are identical,

What they differ only in the quantity of the serum in which they are suspended, and that if the fibrinous globules of the blood be fixed upon the surface on which they are secreted, they form epidermoid cellules; "if then we view the skin as a glandular organ, and the epidermis as the creation of a rapid and constant excretion, which, interrupted from any cause, must necessarily disorder the functions of the lungs or Kidneys, it will be apparent that when the functions of the skin are arrested, the Kidneys must eliminate a substance not found in their normal secretion. We should not however, look for albumen in the Unive, in all cases of interrulation of the skin's functions, for it is only when it exists in excess in the system, and when the Kidneys fail to effeet its transformation into its own peculiar principles, that we should expect to find it in a marked degree in their excretion. Whenever the functions of the skin are suspended or obstructed, we find a determination of albunew to the Lidneys, and it is excreted therefrom in its undecomposed state; but it is upon the

subsidence of the febrile action, and during convalescence, that allumen is most usually found in the Unni of Jyplus in appreciable amounts. M. Martin Solon asserted that the presence of albumen in the Unio during the progress of fevers, is a critical diagnostic of the convaliscent stage; but he afterwards renounced that opinion, on the discovery of the error of not having made the important distinction between the precipitates evolved by heat and nitric acid and by the latter, alone. the former only being albumen, the latter, Wrate of ammonia. In the Unine of 23 cases of Typhus submitted to chemical analysis, albumen was found in only four cases, whilst the Urate of ammonia was obtained in fifteen. The comparitive infrequency of albumen and the period of its elimination corroborate the views herein maintained. UREA is in excess in every stage of Lyphus, from its invasion to the reaction of convalescence. As a frequent or nearly universal lesion, in other diseases where Usea is found in the Urine, and not dependent upon a primary affection of the Kidneys, pain in the right he pochondrium is found, denoting either congestion or inflammation

of the Liver. Where severe dysuria exists, the Liver will always be found affected, and where dysuria is present, it is almost always mistaken for gravel, but if an excess of Unicacid or of its concretions is thereby meant, a greater error cannot be made; true gravel exists so seldow that it is not seen in Typhus in one case in fifty. In a fluid state (solution) Uno acid is not an irritant, in the form of calculus, it produces irritation: it is hence assumed that dysuria in Jyphus is dependent upon an excess of Usea, which has many properties in common with nitre, and acts similarly upon the Kidneys. Usea, like hitro, has a cool, sharp cutting taste, whom the fire it deflagrates, emitting a yellowish white flame, instead of the blue flame of nitre. Either substance in excess; induces the same exerciating dysuria, a sympton almost always seen during the course of Jyphus, and occasionally through its whole progress. Generally induced by excess of Usea, it may occasionally be caused by ulceration of the mucous membrane, and various neuralgic combinations, but we are only to notice its causes as existing in an excreted fluid,

In highers there is always more or less torper of the Swir, and in its first stages, an arrest to a greater or less degree of its functions, hence the sidneys as the great enunctions of the system, carry off the larger portion of the added elevermentations matter, and this state of the Swir is excessive. In Uni acid is also formed in excess, but even in these cases the excess of Urea is the cause of the dysuria, for a mere excess of Unic acid is not productive of pain.

TESTS OF UREA. Let the Union be waporated to the consultance of an extract, then dilute with a small portion of distilled water when cold, add Nitric acid, Netrate of Usea will be precipitated in white, pearly scales: - dilute with as little more water and add Carl. of Potapa to the exact point of saheration; let it stand until crystals of Nitrate of Octapa are deposited, then pour off the supernatant liquid and evaporate, Urea will be deposited in crystals which may be purified by the usual processes. The annexed is an extremely delicate method of proving the presence of Usea, after the Nitrate of Usea has been formed by the process described,

dissolve it in a small quantity of distilled water, and heat it an irow spoon over a lamp, the Nitrate is decomposed and some of its elements combine with the irow. - transfer this product again deluted, into a glass vessel, and adda small portion of pure Potass, and a teautiful pricipitate of Pruesuais Blue will be thrown down.

absolute demonstration of the law established by Lubig, "that stown is the result of the decomposition of the introgenized hisaes of the line ing organisms." In Typhus, the patient lates little or no food, yet a considerable excess of Una is eliminated; and this excess is not merely relative to the quantity of wakery particles seened, but absolute, compand to its normal amount. Whence themits sources, if not from the tissues undergoing decomposition? The formation of Unea in the extreme textures is most likely dewham insufficient supply of Oregon, whereby Carline acid and water are not produced in their normal proportions, their elements passing through a series of arrangements resulting with formation

of new compounds.

THEORY OF RESPIRATON. In health, a determinate quantity of Opygen enters the system by respiration, and it bears a direct relation to the amount of Carbonic acid expired. In the experiments of Lavoisier, the proportion of objgen by volume, consumed, compared with the carbonic acid expired, is as 100. to 81.5 a result coincident with the experiments of Davy, hence for all practical purposes, we may assume the excess of orlygens to be one fifth. These numbers are nearly the same as those quen by Graham expressive of the different volumes of orygen and carbonic acid, the former being to the latter, as 95 to 81, Graham's theory of respiration based on the law of diffusion is at once simple and conclusive, it may be thus expressed: - gases displace each other in direct relation to their specific gravities, thus 95 volumes of olygen occupy more space than 81 volumes of carbonic acid, consequently when the oxygen enters the air cells, it must cause a displacement of their parieties, and thus supplies a should necessary to the respiratory movements. It will hence appear

under this law of diffusion (which has never been disputed,) that the oxygen must of necessity displace a smaller quanthy of carbonic acid, a fact in agreeance with the experiments of Lavoisier, Seguir and Davy. FORMAION OF UREA. From the above data, the exection of a formula showing the production of Urea, Water and Carbonic acid is easy. We must subtract from fibrine its elements with proportions necessary to form Urea, then combine the remaining carbon with such a quantity of almospheric air as may be necessary to change it into carbonic acid. If we now take one fifth of the amount of objgen taken into the system in excees, adding to it the objgen yet remaining in the compound, and combine the then whole quantity of oxygen with the remaining hydrogen, the equivalents will be in the exact proportions to form water, thus now one equivalent of carton combines with two equivalents of oxygen. to form carbonic acid; then 42 equivalents of carbon require 84 equiv-

alents of oxygen which enters the system by respiration, with an additional fifth or about I requivalents more; if we add these 1 / equivalents to the remaining 8, we have 25 equivalents, only one more than the 24 equivalents of hydrogen required for the formation of water: - thus 42 24 8 101 equived.

42 equives of Carbonic acid 42 24 109

24 ... Water 24 24 108 being only one equivalent less than the number added and which added number was taken as one fifth, an amount really larger than thenactual proportion. It is probable the organ of the atmosphere first combines with the carbon and bydrogen of the fibrine, to form carbonic acid and water, and thus leaves it in the exact proportions to form Urea, But in dix eases wherein the lungs are in such a condition as to preclude the full admission of atmospheric air, a sufficiency of of gen is not present to effect the decomposition of the carbon and hydrogen which therefore combines to form oily matter for the purpose of exerction.

## OILY MATTER, COLORING MATTER, AND URIC ACID may be well considered under one head as there is a peculiar connection between them, and they also bear a mutual relation in the Urine. The coloring matter may be in excess from an excess of Unic acid or of the oily matters, the latter are seldow found in great excess, unless there is a large accumulation of the azotized elements in the Unive. In the first stage of Typhus as in all low modes of fever, the Univer generally deposits phosphatic salts, and an only film will be found on its surface, but even in these cases an excess of Una or of Unio acid will be found, except in very rare instances. The alkalis of such Unive after exposure to the atmosphere, form new combinations, and the only matters they contained are set free; such Unine exhales a strong animal odor during michieration. But we may not suppose that Urino throwing down a dense, white, deposit contains more oily matter, than under circumstances where that prop-

erty is not apparent, it is rather presumable that the film

is the consequence of the feeble affinity of the acid of the oil and

its base, for when there is an excess of Unic acid and ammonia the larger quantity of oily matter is found; although, after rest, a pellicle may not be formed. The decomposition of Silvine & is not the only source from whence the oily matter is derived, for there is always an available quantity of adepose matter in the system, and in the incipiency of febrile diseases, when the digestive functions are impaired, that is the source from whence the greater part of the oily matter is eliminated by the Lidneys, and it shows why it should be in excess in the Unio, when the nitrogenized particles do not so decidedly preponderate. The oily matter is taken up to supply waste, but perverted organic action prevents to passing through the necessary changes, and it is consequently eliminated through the Kidneys. But this is not the main source of the oily matter in the Unine in the more advanced stages of the desease, for it is more abundant in Typhus and near the termination of the disease, when there is no fat remains to betaken up by the absorbents, and when the subrogenized particles are much more abundant.

COLORING MATTER. The free coloring matter of the Univers independent of the amount of une acid, being often intensely. deep when but a small quantity of that acid is present, and wie versa. An excess of this acid in febrile disorders is commonly marked by an excess of coloring matter, and is, while in solutions, probably chemically combined therewith. Coloning matter is found in the Urine free, and combined, and the tints of the salts formed from the action of Mitric acid on Urenamay be attributed to the combined coloring matter, this is the opinion of Duverney. If Liquor Potassae be added to high colored Unine, a greenish tint is at first seen, and subsequently the color almost disappears, if on the contrary, Mitie acid be added . The spot on which it falls becomes clearer with a slight roseate tinge, and the Unive eventually loses its color, this rosedte tinge is not deepened by ammonia. If Liquir Potassae is added to Unive containing an excess of Unic acid, the green tint is also produced, with the addition of a vivid carmine halo in proportion to the amount of super-wrate of Ammonia it contains. If netric acid be dropped upon a portion of the same Urine, it is reddened at

the point of contact and the halo is palegreen, and if ammonia be now added, the halo is deepened and the color is permanent. In the first experiment there was a single reaction, in the latter, a double one; in the first, the roseate tinge was transitory, in the second, permanent and deepened by ammonia. The coloring matter of the Unine has not hitherto been isolated for analysis, it is doubtless identical with that of the Blood. The following experiment affords some evidence thereof. A forhim of the fluid effused into the pericardium, slightly mixed with Blood, is allowed to stand for two days, the fibrine with some adhering coloring matter is now to be carefully removed, and the albuminous portion carefully duanted. Distilled water is now to be added to the red particles remaining in the vessel, until it assumes the color of Unive. On adding Ligion Potaesav the fluid becomes light green and the color gradually disappears, if Mitric acid is carefully added to another portion thereof the roseate tinge is at once produced but an added quantity renders the liquid colorless This experiment is valuable as an approximate truth.

# OF URINE BILE AND BLOOD. Vito-chemical

researches make an affinity between the coloring matter of these todies almost a matter of certainty, and we know that Iron exect in the Bile. Whether the color of the Blood does or does not depend upon the Srow it contains is yet a mooted point, the weight of authority inclines to the negative. Iron has never yet been detected witho Unine although cases are on record in which patients suffering under en largement of the Liver and Spleen, voided blue Urine, for which I can only offer the following rationale, a portion of the Iron of the Bile was secreted with the Urine, where it probably passed through a series of combinations with the products of Una in a state of transformation, similar to that noted under the division, "Jests for Usea". one of which gave a precipitate of Omesian Blue. There is little doubt that further researches will establish the identity of the coloring matter in each of the above formations. One important fact remains to be noheed; - when the kidneys secrete any particular principle in excess, they suffer it to pass unchanged, whereas the same principle

secreted in a much smaller quantity is generally eliminated into other compounds.

URIC ACID. a deposit of Unic acid, Known as the latritions sediment occurs upon the subsidence of all low fevers. Before the commencement of febrile action there is little or no excess of Unic acid, in the prior stages, Unais the only azotized substance in excess. We here find a valuable diagnostic fact. At this stage of the fever, (ceseation) the Unio holds in solution a larger quantity of Unic acid than an equivalent of boiling water could dissolve. Duverney supposed that this superior solubility of Unicacid was caused by its combination with coloring matter, but Prout maintained that it is in combination with ammoned with an excess of acid, in the form of super-wrate of ammonia, I shall offer yet another view; - let us suppose that the oily matters in excess. (always found in these circumstances,) are combined with the wrate of ammonia, probably with some free ammonia also, from which cause a larger quantity of Unic acid passes through the Lidney's than could otherwise occur, We shall hence have formed Infinite Wisdom, the living membrane of the bladder and weether is protected from irritation, the very substances which would have acted as irritants, being thus rendered inocious. Reagents readily separate the oily matter from its combinations as Sulphate of Iron, Elher. &c.

## ORIGIN OF THE URIC ACID. We have sun

that Una is the result of the transformation of Silvino, alluminesses and I may now suggest that Unic acid is the result of the decomposition of the red particles of the Blood. We know that in y plus, the Blood is not effectively vitalised or in other words, that it is not combined with the normal proportion of oxygen, and in extreme cases it is incapable of so doing even by exposure to the atmosphere. This defect causes a necessary change in the composition of the Hamatovine. It is defect with its oxygen and is reddened, but ofter a second condination it is insaffected thereby, or if a portion of the coloring matter which has been kept beneath the serient for a few days, and never oxygen-

ised, be then exposed to the air, the usual changes are not induced; from these facts we may reason that the coloning matter has combined with an excess of carbonic acid and is thereby deprived of its distinctive characters. The same effects no doubt occur within the body. In the early stages of Typhus, the Blood acknowledges the influence of oxygen, in the more advanced ones it loves this property, and eventually but a small portion of it combines with the objain of the atmosphere. Now this fact stands out as the most important point in the vito-chemistry fall low fevers, for if the coloring particles, (the carriers of opygen according to Lielig) have lost the power of combination with obygen, now of the functions dependent upon arterialisation of the Blood can be performed, and therefore chemical death in the Blood, ensues. But before health can be restored, these morbid particles must be eliminated from the system, and their elimination developes the Uni acid and the oily and coloring matter always found in the Urine in Typhus. These principles would however be subject to certain modifications, if the Liver was in a normal condition, but when the acid is in very large

excess in the Unine, he patic derangement will always be found. FORMATION OF URIC ACID. The coloning matter of the Blood is identical with Fibrine, although more nearly related thento than is any other animal principle. according to Michaels, 1000 parts of the coloring matter of venous blood, yield the following products, 532.31 173.72 77.11 216.66 We thus reduce there numbers trequiralents, 1 atom of Carlow wighs 16. 34/ - of Nihogen 1/1.04 - of Androgen 12. 478- of Olygen, 100. Divide the number of parts by the atomic weights and we have 6.792 .983 6.261 2.166 How we reduce these results to the nearest approximate whole numbers, thus, take it equivalents of coloring matter (adding to each one equiv. of Carton in excess to prevent arterialization) and we have

H equivalents of Hamatosine 28 4 25

H " Carbon added H

32 4 25

Hequivalents {2 " Oily Matter 22 20

" Water 32 4 25 It is hence apparent that the morbid coloring matter of the Blood is readily transformable into the identical principles we found in the Unine at the precise period when we should rationally look

for them to be eliminated, that is, when the skin begins to look less lived and dusky, the eye brighter and the pulse firmer, or at the period of commencing reaction; and it is then only that an excess of thrie acid is found in the Univ., whilst the amount eliminated will depend upon the intensity of the disease, and the extent of the departure of other organs from their normal conditions. We added Carbon to the Blood instead of Carbonic acid, for it is probable that the Carbonic acid is decomposed in this disease, whereby the Carbonic fixed and the Organ liberated to form new combinations, and it is probable that such decompositions cause the new oridations of the senses Bood.

## THE GENERAL SYMPTOMS OF TYPHUS,

loins with head ache or stuper. Lassitude, weariness or muscular prostration, (although alone not diagnostic of Typhus,) yet afford us a valuable criterion in prognosis in its different stages, being always present and first demand my attention; for as the prostration is great or little so will the prognosis be favorable or otherwise. At first there is only a disinclination for any muscular movements.

which in the more advanced stages is marked by inability to main tain the erect position, soon followed by unbroken recumbency, whilst lying; the sences are more or less fleded and the head is himed to one side, usually from the light. In this state the patient is conscious and to alleviate his realization of muscular fatigue, assumes the position most favorable for rest, the state of equilibrium of the muscular forces. The flexed position of the lindo assumed in sleep, permits the contractile force of each muscular filre to balance its opponent without inducing consciousness, and when the forces are at their minimum; for upon the desturbance of this equilibrium, consciousness of effort to effect an ininease of force is at once induced; this state is designated relatation, a very fallacions term. One set of muscles may be in an active state as regards volition; and another set passive. but this condition would not be relaxation, a phrase more properly applied to that marked prostration accompanied by unconsciousness, so apparent in the last hours of the patient. In the passive state, each muscular fibre everts only that degree of contractility called the

Some of the muscle, and which, with the whole muscular syskeno, is just sufficient to support the bones and the soft parts, which are the natural resistance to the tone of the muscles. During life the lower portion of each limb acts as a weight whereby the upper portion is drawn into a right line with it; thus the whole leg acts whom the hip-joint, and the fore-leg, whom the Knee joint; when the patient is upon his back, if the muscular hone is deficient, a state of complete supinations must ensue. When the tone of the muscles is not greatly reduced, the patient will lay on the side with flexed limbs, the state of rest; but not of relaxation: and this position is retained only bethe tone of the muscles, which, failing, the legs are extended, assisting in throwing the body on its broadest surface . the back , which is the true position of general relaxation, the body now obeying the law of gravity alone, we are hence assured that when this state exists, death is near at hand. The muscular condition may be divided into four distinctive stages; Ist. Defective Volibion. 2d. Cowerlessness, 3rd. The Passive Stage. 4th. Relax-

ahow. Muscular relaxation is primarily caused by the change of conditions in the extreme bethere and not by any disturbance of the nervous centres, for it will sometimes occur in the earlier stages, that nervous centres may be but little disturbed, while the muscular depression is considerable, indeed these two phenomena seldom have a direct relation to each other, for the affection of the brain and the spinal cord may be extreme, and the powerbessness inconsiderable, and vice versa; hence loss of muscular power much be dependent whom some change progressing in the substance of the muscle itself. The same fact is seen in an attack of Muco - Enteritis, apr affection much resembling Typhus, presenting the same prostration although in Muco Enterities there is little or no cerebral disturbance.

MUSCULAR RELAXATON. That stage of Typhus in which the muscular system is to the greatest extent influenced by the condition of the nervous centres, is that of relaxation, the result of exhaustion of the brain, accompanying relaxation of the sphiniters and dilation of the peoples, phenomina attributable to

the same cause. The Inis from its superior succeptibility, is usually earlier affected than any other muscular organ, but as its cause is the same, it affords a valuable criterion of the state of the whole muscular system. There is no diagnostic as expressive of the power of the whole organism, as the state of the muscles. The symptoms indicating the most danger, are a dilated pupil, falling of the upper eyelid, subsultes known in dilated pupil, falling of the upper eyelid, subsultes known in of extreme musual extensions and the supine condition, all expressive of extreme musual relaxation, the effects of a morbid condition of the nervous centers, and the loss of menous energy. These reflections naturally leads us to a review of the

and inflammation of the brain and its mininges are the most important pathological phenomena, and which are so generally recognised, as to sender necessary only the peculiarities by which they may be contradishinguished. According to Louis, "the substance of the brain itself is generally the affected part, they medullary portion being injected in six seventles of his cases, whilst the cortical substance presents

alnormal vascularity in only three sevenths. In rather more than half the cases observed by him, there was increased redness of the arachnoid and pia-mater, but the dura-mater was seldom implicated, and it is noticeable that the injection of the pia-mater and brain was greatest in those cases which somest terminated fatally; whilst in those in which death was longest delayed, effusion was always found. Sometimes the brain was abnormally dense or soft, but as in this condition the whole organ was implicated, it was not the result of inflammation. The following statistics from Gallemand are valuable. In 46 cases of Cerebritis, 33 showed evidence of previous inflammation of the cortical structure, and only 8, of inflammahow of the medullary portion: - in 16 cases the cortical structure covering the convolutions was principally affected, in 13, the corpora-striata and optic halani and in Honly the tuber-

INFLAMMATORY? In Cerebritis, the cortical shuchure

is affected, compared with the medullary, in the rates of 4 to 1; in Typhus the proportions are reversed, and the medullary compared with the cortical, is affected in the ratio of 2 to 1. Now the question is pertinent, - Is the affection of the brain and its membranes, in Typhus, generally of an inflammatory character? We reply, it is not. The distinctions are well marked between acute Cerebritis and the cerebral sensation of Typhus. In Cerebritis, the injection is limited to definite spots, in Typhus it is general: in Cerebritis the adjacent parts are abnormally denser or softer, with occasional serous or purulent infiltration and apopliche spots, - these lesions are rarely found in Typhus: in Cerebritis the diffused fluid is usually opaque, in Typhus it is almost always transparent. From these facts we conclude that the cerebral lesions in Typhus are congestive. The effusion autopsically found, is alone no evidence of previous inflammation, for it is Known that Sowards the termination of many diseases, the serous and mucaus surfaces exphale fluids, and sometimes in enormous quantity; the skin also does the same, and in Typhus on the approach of

death, its exhalation not uncommonly becomes very profuse and offensive. Effecien into the rentricles of the brain, or between its membranes is most common in cases which have lingered along for some time, and this fact evidences that the effusion is passive - the result of want of tone of the secreting vessels. Upon this point, observation and vito chemical researches are in agreeance. Inflammation of the brain or its membranes is sometimes found in jyphus but only at its commencement, but in the great majority of cases, congestion alone is found from the beginning of the attack, and in fatal cases, the evidences of general congection and effusion are indispetable. In inflammation of the membranes the pair is more intense and lancinating, with a sense of weight and fullness at the top of the head, thereyes are suffused and averted from the light, there is intolerance of sound, great pyretia and exaltation of the senses. In congestion, the external senses are only slightly affected, becoming less impressible as the disease advances, and the fever throughout is lower in mode. The

neurilema of the newes of sense is probably affected in inflammation of the brain, but is intact in congestion: - the eye is a good diagnostic of these several cerebral conditions: in congestion it is dull and hazy, the pupil sluggish, this is the usual aspect in Typhus. This dull appearance is sometimes succeeded by a clear glieteneing brightness, which must not be confounded with the suffused, injected eye of inflammation; it is on the contrary, symptom asie of hectic, and pathognomonic of suppuration of the glands of the ileund. The hectic stage of "uphus is barely noticed by authors, but where necessary pathological conditions exist, it is as definitely marked as in Phthieis. It indicate suppuration of the glands of the lungs, the abdominal glands, or both: but these points will be more fully considered hereafter: I have only noticed them in demonstration of the eye as a diagnostic. The clear glassy eye in Typhus, is too often mistaker for the harlinger of returning health, and its delusive promises receive apparent confirmation from the clear red tongue and flushed check accompanying it, whilst in fact there are but the indications of extensive disease of the glands and mucous surfaces.

### MECHANICAL CAUSES OF CONCESTION AND EFFUSION.

We have already shown that actual inflammation of the brain and membranes is comparitively rare in Typhus, but that congestion exists in every case, nor should it surprise us that the brain is congested and the pear mater loaded with blood it would be more surprising if such was not the case when every other organ is in that condition. Congestion is the effect, never the cause of disease, and seldow demands medical interference. Many of the symptoms and post morten appearances in Typhus, are directly induced by mechanical causes. The brain, in common with every other fatty and allumiword portion of the organism, is subject to rapid watte in this disease, and from the non-yielding structure of the cranium, the dinumition of the volume of the brain causes a vacuum between its membranes, which alone would cause pain and a sense of weight, besides attracting enough blood to fill the increased space. Either congection must be thus induced, or a fluid must be effered to maintain the integrity of the mechanical forces, and to prevent under pressure of the cerebral organ, hence disturbance of the brain is seen in every case of Typhus. When the brain diminishes much in volume, as in aged people, or during rapid emociation from

fever, we may always predicate congestion or effection. These views explain many of the difficulties usually present in diseases of the brain, and which have hitherto bow little, if at all understood.

STATE OF THE LUNGS. a true knowledge of

the state of the lungs in Typhus is of practical importance, for although they do not during the fever develope any very prominent local symp toms, yet it is certain that the case is retarded or aggravated in proporhow to their congestion, while their varied affections present some of the most important sequela of the disease. During the progress of the fever congection of the lungs is a constant symptom, commonly accompanied by Bronchites for sub acute character: The congection may develope Prienmoria, or it may call into activity a dormant scrofulous diatheris, and develope Phthisis; indeed such predisposition, when present, will at least render the case more intractable, if not fatal, and the more so if there be added thereto acute gastro-enteritic symptoms. The autopsical appearances are congestion and inflammation and their results, induration and infiltration either serous or punilent, and occasionally the usual symptoms of Phthisis are manifected Every organ is under morbed influence during Syphus, and indeed in every other febrile modification, and the risks induced thereby may be thus stated; during the fever, leaving the liver are to be most feared and affections of the lungs in the convalent stage, but lesions of the digestion apparatus demand attention through every stage of the disease, and until the full restoration of the mormals or health condition. The Spleen is always inactation of the mormals or health condition. The Spleen is always inactation with inflammation, but cases are in meand in which abscess was found on that viscus, in connection with inflammation of the serves covering of the Diaphragen. The liver is generally engested and sometimes inflammation superious, and softening thereof is of frequent occurrency.

### STATE OF THE LYMPHATIC SYSTEM.

Those components of the digestive system whose lesions are the most characteristic of Lyphus, are the glandular organs of the intestines and the general lymphatics. Every other organ appears at first to be only congested, but the sequela will depend upon the intensity of the fever and the idio syncrasist of the patient, but the glandular system suffers from the first, by the action of

The virus passing through a series of changes which maintain and aggravate the constitutional disturbance. Imm the very general implication of the glands of the gastro intestinal surface, Bronesais created his theory of the cause of Lythous; but he was in error in limiting the pathology of Typhus to these glands, as they only a part of the system designed to prepare the food for the purpose of nutrition; and although they may not be diseased, the system of which they form a part is always so.

## IDENTITY OF FUNCTION OF THE ABDOMINAL AND GENERAL LYMPHATIC SYSTEMS.

That the mesenteric glands, the lymphatic glands and the glands of the intestinal mucous surface perform the same functions, may not at first thought leapparent, but physiology and chemistry both sanchin and confirm the assertion, In mesenterio disease, induration and suppuration of the glands of the intestines are commonly present, included it is probable that in the last stages of the disease, these glands are always involved. Autopsical observations attest that when death has occurred from mesenteric disease, the glands of the

muco-intestinal surface are always diseased, and sometimes primary indurations thereof were perceptible beneath the transparent mucous membrane showing that it was only secondarily
affected. It is already admitted that simple meenteric disease is never
fatal, but that death is induced by disease of the mucous surface of
the intestines and glands, and in Phthisis, disease of the mesenteric
glands and the glands of the ileuw are almost in every case coexistent.

### STATE OF THE LYMPHATIC SYSTEM IN TYPHUS.

In Typhus, the two lesions almost always coexist, although inflammation, seftening, or suppuration of the glands of the ileum may not always to apparent, yet disease of the mesentene glands is nearly always cognisable, a position affirmed by care full observers in all lands, that the general absorbent system is always either functionally or show her lands, in Typhus, is proved by the rapid emocration of the body, as also by those affections of the glands so often presenting as sequela. Although disease of the iles intestinal canal is marked by eymptoms of greater granty than of the mesentene, owing to their meanues to the mucous surface, yet it is not more pathognomous

of Typhees, nor are either of more importance than the general affection of the absorbent system, Hence the theory of Browsais was defective both in fact and inference, in fact, by the partial and delusive dogma, "that lesion of the iles intestinal glands was the only pathological condition essenhad to Typhus, "whereas the mesenteric glands are more frequently diseased: and in inference, that the fever was only irritation, or secondary to the local affection, When the glands of the mucous surface are suppurating, the delicate plexus of vessels and absorbents in the mesentery, (within about a quarter of an inch of its duplicature to enclose the intestine,) is largely injected and the absorbents are of a dull white color, being falled with purelent matter. The lackeals pass on to the mesenteric glands, furnishing a continuous chain of inflammatory action. The inflammation of the lacteals is identical with that induced by the application of a possow to the skind, nor does it matter how it is takenup, for its effect upon the system is under all circumstances the same, Thus Jartar

Emetic injected into the veins produces vomiting, Murcury rubbed into the skin causes salivation, and Strychnia applied to an abraded surface produces death as certainly as though taken into the stomach, in short, every porson introduced into the system has a determined action thereon, hence the virus of Syphus however introduced, exercises its specific catalytic influence on the absorbent lymphatic system. The consequence of this condition of the lacteals is anorexia, and loss of power of the digestive organs: to remedy which, the systemic absorbents commence taking up the fatty matter found in the cells of the adipose tissues, but these principles not passing through the requisite changes, soon occasion inflammation therein. This increased activity of the systemic absorbents is one of the most marked phenomena in Lyphus, arising from the demand made upon the unorganized mass of matter of the system, to supply the waster rapidly progressing in the extreme texture. It is probable that the whole absorbent system is rendered morbidly active by the

nines, and that the increased action of the systemic absorbents, is not entirely secondary to the affection of the abdominal glands; for in the Plague a disease much like Syphus, the inflammation of the absorbents is the pathognomonic symptom. The black death also was marked by the evolution of buloes, or abscesses of the lymphatic glands of the general system. a full consideration of the vito-chemical conditions of the absorbent system, in various diseases, will furnish full evidence that the lactuals and lymphatics perform the same office. to wit: - the preparation of food for the purposes of nutrition. Hunter supposed that the lymphatics absorbed the waste matter of the system; whilst Magendie denies that the absorbents, so called, posses the power of absorption; - Miller maintains that they received the liquor sanguines direct from the capillaries, a view opposed to their absorbent action. Miller's theory was based upon the qualities of the fluids found in the lymphatics, but he failed to notice the proportions their constituents bear to each other. We cannot obtain a true knowledge of the pathology of any disease, without of all knowledge of the normal state of the parts involved; hence it is necessary that we should ascertain the peculiar properties of the fluids in the absorbent vessels.

# IDENTITY OF FUNCTION OF THE WHOLE LYMPHATIC SYSTEM PROVED PHYSIOLOGICALLY.

We have assisted that the functions of the lymphatic are identical with those of the lacteals. That they do not take up waste matter or the effete particles of the body, and that they are not merely the vehicles of the colorless legior sanguines. It is evident that the glands through which the absolute that pass, assist in the preparation of food for nutrition, in the same manner as the mesentene glands of the abdonew, in short, that the lactuals and the lymphatics with their glands, from one complete digistive system. An examination of the relative proportions of the fluids they severally contains, will imped us to this conclusion.

matters, allumen and salts are the principles found in excess in healthey lymph. If we compare the proportions of each of these principles withe blood and lymph, their wide difference is at once apparent. According to Licanus 1000 parts of blood contain on an awage 1.65 of enjelable sable fathy matter, and 1.15 forly matter, being less than 3 parts
in the 1000. Of all the constituents of the blood, filmine possesses
relatively, the greakest amount of only matter, which according to linerecell is from 14 to 5 per cent. Marchand and belleng in their analysis
of lymphs, found only 2.65 parts of only and fathy matters in the 1000,
about 1/8 less than expets in an equivalent amount of blood: but if the agweres particles are deducted, and the relative proportions of the oily principles compared with the residual solid contents, be ascertained, a great
difference is apparent.

AMOUNT OF SOLID MATTERS IN BLOOD AND LYMPH RESPECTIVELY. Prevost and Dumas obtained from 1000 parts of blood 129. 30 of coagulum, which compared to the only matters is as 44 3 to 1. 1000 parts of lymph combain 5. 20 parts of filme which compared with the only matters is only as 2 to 1. It is thus seen that there are 43 times more financial in the blood than only matter, and only twice as much in the lymph, showing conclusively a large relative excess of only matters in the lymph, compared with blood. The same chemists found in 1000 parts of blood,

86.90 falbumen, whilst marchand and bollery found only 4.34 parts of that principle in 1000 of lymph. We find therefore, that lymph contains in the same amount of solid ingredients, horce as much albumen, and havenly one himes as much oily matter as the blood. There is evidence of intelligent design in this marked disposition of the organic principles in the lymphatic vessels, showing that they are not mere organs of transit for the colorless liquor sanguinis, and that they do not take up the effete matters of the sysheno, but that they are truly and efficiently, digestive organs: that in them the oily matters pass through important changes, being converted into allumen, and this again into Tibine. The oily matters may be deemed the principles of nutrition, for with the exception of the fibrine and albumen taken into the system already formed, it is well known that all the other principles are compounds of starch, which before assimilation, is converted into oily matters. now in the same manner as the lackals digest theoily matter formed from the starch contained in the food, so do the lymphatics digest the oily mattersabsorbed from the system. The adipose system is a

In analogy between the lackals and the lymphatics as to their contents, is equally significant, only matters being ingreat excess with latter, and in the former, filme does not appear until they have received the lymph from the spleen, and through the mesentine glands. The conversion of only matters into ago tiged principles cannot be maintained unless there to a sufficient supply of said principles from the blood, hence the absorbent and mesentine glands are abundantly supplied with arterial blood, and as all these glands are devoid of ducks, must we not necessarily conclude that they all fulfills the same office in the economy?

ASSIMILATION IN HYBERNATING ANIMALS. In the phenomena of hybernation, additional proof is found of the position we have assumed, for when animals seclude themselves for their Winter's sleep, their adipose tiesue is loaded with fat, which on their return to normal life in the Spring, has been wholly consumed. Whence the disappearance of the fat? Julig assumes that it has been consumed in the process of respiration, but if that is true, what

furnished subsistence during the normal state? and whence is the waste replaced, so that life may be maintained? It is known that bile and wrine are secreted during the domant state, and their secretion is consequent upon the disintegrating action progressing in the extreme texture. Now it must be evident that these processes could not be maintained, however slowly, for any length of hime, without inducing disease or death, unless new increments of agorized principles were continually supplied to the system, respiration alone could not sustain life, it would rather hasten its termination; but, recognizing the conversion of falty matter into albumen, we can at once see how the chemical and vital functions are sustained. Martell cites the case of a pig which was accidentally buried under ground sixty days, duning which time it lost 150 les in weight. Is it not incontro vertible that in this case the loss of weight and the maintenance of life were inseparable? In asserting therefore, that when circumstances demand it, an animal lives upon itself, is claiming no more than has been partially admitted; but it is important

that demonstration should take the place of admission, and to this end, we must understand the mode of assimilation, by a smowledge of the organs which effect the necessary changes.

### CHANGE OF OILY MATTER INTO ALBUMEN IN THE EGG.

The transformation of oily matter into allumen in the egg is fraught with instruction. At first the amount of the white (Albanew) is small, and the yolk large. The yolk contains a large quantity of oily matters in combination with the albumen, but gradually the whiteis much increased in amount, and that increase is relative to the decrease of the fatty principles. Here also, vily matters are converted into albumen: but what is the mode of change? as the albumen forms, asspace is left at the large end of the egg owing to the disappearance of watery particles, and this is filled with almosphericair, but there is a disproportion in its elements, for Dulks and Bischoff found it to contain an excess of 4 perch. of of gen. Whence this excess? We answer, the Nitrogen was absorbed in the process of the conversion of the rely matters into albunew, for from no other source could the particles have become azotized

#### THE SAME CHANGE EFFECTED IN THE HUMAN SYSTEM.

In illustration of the conversion of oily matters into azotyied principles, we refer again to the formula already introduced, showing that by the addition of Uno acid to vily matter, we obtained the equivalents of the red particles. If we further add to three equivalents of only matter, one and a half equivalents of Unic acid, we obtain Proteine, Filme or albumen; thus, -3 equivalents of Dily Matter 33 30 3

1/2 ... Unic acid 15 6 6 9

48 6 36 12 forming one equivalent of Proteine minus two atoms of offgen, It hence appears that Uni acid or its elements is a most important agent in the assimilation of oily matters which from the bases of certain parts four food, and it is almost beyond doubt that these changes are effected chiefly, if not wholly, in the lymphatio system, thus combining the lacteals and external lymphatics with their respective glands, further, this view of their function accounts for the large quantity of arherial blood supplied to them; and further, it indicates that all those glandular structures which have no efferential ducts, perform the same function. This elimination of Uni acid, and its combinations with oily matters, must not be confounded with the general formation of Uni acid in the extreme textures: not but that the same changes may to a limited extent, occur in the circulating mass: but the conversion of oily matters into albumen is so gradual a process, that in the circulating mass this change bears no proportion to its true and proper office of uniting with Oxygen to form Water and Carbonic acid in the evolution of heat. Proust has shown that after a full meal foily matter, the Urine contains an unusual amount of Unicacid, which Leibig explains on the supposition that the oily matter combines with a larger proportion of Copygent, and withdraws such increased portions from the quantity necessary for the maintenance of the normal action of the extreme texture, the result, is the formation of Unic acid, which no doubt is generally the case. The Unic acid formed in the extreme betheres is properly a substance for excretion, for the oily matter with which it comes vicon tack in the circulation, have a greater affinity for Oxygen than for it, and hence these changes for the purpose of nutrition, which we have predicated upon the lymphatics, do not occur in any appreciable degree; but we may not consider Unic acid or its elements as

a mere exerction, for it is a most important and essential agotizing agent in herbivorous and carnivorous life. He have been Thus full in our views of the function of the lymphatic system, that the pathology of Typhus may be fully demonstrated, for it is useless to attempt the comprehension of the pathology of any disease, unless we fully understand the indications presented by the physiology of the organs implicated. The function of the absorbents is dependent upon the condition of the blood. In the period of increased action in the early stage of Typhus, the coagulum of the blood is greater in quantity, fine, and tensciones; at a later period, the salines, and aqueous particles are much diminished, whilet the coloning particles are almost black, and are frequently pricipitated. As the fatal termination approaches, the coagulum is very small, the blood is a greenish black, eoft, tarry looking mass. Let us ascertain what relation these facts bear to the action of the lymphatics. It is probable that in the first, or increasing stage, a considerable por how of the fatty matter supplied by the vigorous action of

the lymphatics, combines with the Unicleid to form fibrine; as
the disease advances, the functions of the absorbents is suepended,
and the fatty matters are no longer digested, but pass off
with the Urea, so largely increased in amount. In the later
stages, inflammation and supparation ensue, and constitute
the pathology of Typhus.

and characterized by an hamorhagic tendency, and the organs mock commonly affected are the stew, the lungs and the lowels. Blacked differ much in aspect, but it is needless to dietinguishmen than three varieties. In the first, they are of a bright and color, of the sign of a fair's head, and are often michaken for the lite of fleas or mosquitoes, from which they are however dietinguished by the absence of a central dot and circumfrential areola, they commonly receive about the fourth day, and usually on the neck and breet. If the fever is not very severe, they retain their color during its continuance, but a change from a bright not to a livid or during the hue, is unfarrable, and the more sudden the change, the

more alarming the indication. Petechia of a bright red color do not warrant un unfavorable prognosis, but when they assume the livid hint, there is little hope for the patient. In the third kind, the Petechia are known as Vibries, they are of large size, lived or greenish black, and are always unfavorable. In diseases of excess ive violence as the Plaque, they appear almost simultaneously with the attack; and this remark applies in extremely malignant cases of Jypshus; usually however, they do not appear untila short hime before death of which they are the precursor HÆMORRHAGES, particularly from the bruchs, are frequent in fatal cases, and the quantity of dark decomposed blood sometimes poured out from the mucous membrane is astonishing. A case is on record of a young woman 16 years of age; from whose bowels three large urinals of blood was poured out previous to death. HÆMOPTYSIS sometimes occurs in Lyphus, and may be attribwhen he has same cause as when from any other organ is - decompositions of the blood and loss of how of the capillaries. To this, some cases are more predisposed than others; and certain forms of Lyphus induce an increased

juintly manifested. We have learn that in this, as in other diseases, we have yet much to learn.

THE PETECHIAL ERUPTION. Somuch attention has been paid to this eruption as a diagnostic, that we are induced to give it further consideration . It has been said that this symptom is the true pathognomouse characteristic of Typhus, attending it as uniform by as the eruption of Rubeola or Scarlatina. Chomel and Souis are of this opinion, making it the line of demarcation between this and other continued fevers, and further maintain that the Petechia are renewed every fourth day. It cannot be demid that Petechia are often present in Typhus, but the commencement of their appearance differs largely in different epidemics and at different seasons. In the epidemic in London in 1838, this erreption was seen in almost every case, while in other epidenics it is as infrequent as to excite little if any attention, while in all other respects the closest observations fails to delect any other difference in the disease. It is evident that past observers have eved in determining

the relation of the petechial eruption, by observations made at some special season or during some particular epidemic, anerror which has found apparent confirmation from the impressions of the observer, inducing him to call nothing Jephus, in which the emption was not recognizable. We cannot admit this eruption to be an essential characteristic of Jyphus, yet its appearance furnishes us with an added diagnostic; and the periods it observes in its appearances and remissions, aid as in the elucidation of its pathology. The eruption, (in its early stages disappears under presence of the finger, ) fades away and is replaced by a new crop every fourth day, indicating thereby an intermittent action of the ressels of the cutis, and in this respect, assimilating Typhus to the regular eruptive fevers. THE EXCITING CAUSE OF TYPHUS. Having developed the smichiral and chemical pathology of Typhus, and noticed some of its most distinctive symptoms, we now propose to investigate theultimake producing cause of the disease. We have already shown the profimate chenical cause, nothing now remains but to discuss the ultimate

exciting causes. The producing cause is the same as that which propagates it hence this position involves the question of its infections or contagions character. We define contagion, thus; - the transmission of disease by external contact: infection; - its diffusion by the imbibition of some morbid exhabation suspended in the atmosphere. There are four modes whereby a poison may affect the system; 1st. By absorption through the skin, 2d. By inhabition. 3rd Pay the stomach. 4th By the application factive principles to an abraded surface, whereby it is placed in immediate contact with the capillavies of the blood vessels and the absorbents, and also by direct injection into the blood vessels. An examination of these several modes will enable us to determine how, in any case, the morbific agent obtained access to the organism, as well as the nature of the cause itself: for we cannot determine the fact of a patient having received the infection through the lung, unless he has been exposed to some miasin; nor by the stomach, unless theactive cause has been presented thereto.

THE CONDITIONS AND PROOFS OF CONTAGION. Amount of the

absorption of the virus of Typhus by the lungs and skin presents come important queries . to wit :- Is the disease propagated chiefly or wholly by contact, by the influence of a miason, or both? I am not aware that any authoritation wi her has attempted to disprove the contagious nature of yphus, and the number of well attested cases which have been noted, must certainly be admitted in proof of its contagious character. That Typhus is also communicated by infection, is a fact which cannot be disproven. The following cases which occurred in the year 1843 are of sufficient interest in this connection to be quoted. As young man aged 18 was brought have sick, his disease proved to be Typhus and presented the usual charactivistic symptoms. During the progress of the fever, the family, (consisting of nine persons,) were not affected, but in the stage of reaction, which was accompanied by profuse perspiration, the whole family became affected, with but two exceptions, the first, a boy who slept away from home but book his meals there, and the father, an old man, who although he escaped Typhus, had a febrilo attack of a severe character. The deductions drawn from these facts are valuable; - 1st. The young man was first affected by causes developed within his own system, probably owing to some peculiar atmospheric conditions, for no source of contagion could be traced, nor was any irregularity of diet or habits of intemperance admitted, 2d. The immemity of the whole family until the stage of reaction, with its altendant copious perspiration, when the whole family who were at night exposed thereto, excepting the old man, whose very age modified the influence of the existing cause. 3rd. The immunity of the boy, who although eating at home, slept elsewhere. It she the was not the agent in the propagation of the fever, for the boy who sat at the same table and ate from the same dishes as those who fell under the disease, escaped. Here then we must conclude that the family book The disease by infection; - The mode; - the inhalation of the mortific miasmo thrown off in the perspiration and suspended in the almosphere. Nor was the infection the result of general atmospheric causes, for not a single case occurred out of that house, although the neighborhood was closely built up and densely populated. The fact of the son, who slept from home, escaping the disease is evidence that Typhus is taken into the system during thenight, when the

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vital powers are at their minimum, and the resistance of the system is at its lowest point. Nor was the family affected during the progsess of the fever, nor when at its height, but, in the stage of reactions, a fact corroborative of the position before advanced, that mall cases of infection by inhalation, the period to be dreaded, and in which the extension of the disease is most to be feared, is that in which the virus of the disease is being thrown off by the skin. Before the stage of reaction; - the skin is much like that of a mummy, not that there is not prior to this stage, a peculiar fator always present, arising alike from its surface, and the air expired; but it does not compare with the intolerable exhalation given off, during the profuse perspiration accompanying reaction. We hence learn that the danger of infection is small during the active progress of Typhus, a fact, which if earlier recognized, would have eaved much discussion and apprehension. The period of infection being that of reaction, (convalence) also explains another apparent difficulty. A severe case of Jyphus had been closely watched from 4 to 6 weeks duning its progressive stages, and as none of the attendants took

The fever, up to the hime of convalences, the Spinion was expressed that the diciase was not communicated. But within tendays, some of the attendants presented the unmixtakiable symptoms of Typhus; in all such cases, the causes of the attack have been sought for everywhere but at the right point. In the case of the family cited, the infection was almost immediate, for to that end were all the surroundings favorable, but where cleanliness prevails, and the sick room is constantly and efficiently ventilated, the mortific exhalation is so diluted, as to require a much longer time for it to produce its effects upon the system.

THE NATURE OF THE VIRUS, PHSIOLOGICALLY CONSIDERED.

Convinced that Typhus is a contagious disease and that its communicative power becomes developed during the stage of reaction, it becomes of interest to ascertain the nature of the exhaled virus. Is it a specific nital secretion, or the product of chemical action? Can malana produce disease? if so, what analogy does it bear to the blood in any specific disease so produced? We have evidenced that the virus of exidence disease is specific, the result of definite changes progressing in the

living system, How then can dead animal or regetable matter evolve a principle identical with the vital product? It is indis. putable that none of the products of putrefaction are capable of inducing that series of changes in the living organism which we call fever; on the contrary, their effect, whether in large or small doses, is immediate, terminating within a period proportionale to the volume and intensity of the poisonous exhalations inspired. bases are on record, where the contents of an abdominal abscess underwent decomposition within a few days after the first incision, and when the fluid, which was very large in quantity, was occasionally discharged. The stench was unbearable even by the operator: This condition of the fluid continued for a considerable time, yet the health of the patient was gradually rectored. It may be replied, that although the products of decomposition cannot produce fever, yet the emanations from putrefactive matter in the transition state, may possess that property. The objection is plausible, but before its bruth is admitted, it must be demonstrated that putrefactive matter in the

brancition state, possesses the same constitution as the virus in the living system. I do not assert that such matter cannot cause fever, but to do so it must come into contact with some lesion whereby it can gain direct entrance into the circulation, a result seldom possible, and not entitled as a source of disease, to be considered a general law.

### EVIDENCE THAT MALARIA IS NOT THE CAUSE OF TYPHUS

Me shall under this section, carefully cite the evidence derived from their ment and observation. The dogma has long pervailed that Malaria are in most instances the cause of Epidemics: and that Typhus, when it assumes the epidemic form, is the result of malariae other lations. In agreeance with this dogma the reports of Brands of Health," and of "Sandary Commissions," are formed. I were prevails in a given house, locality or district, and in that mightorhered a dang-hell, or a foul open sever exists; consequently the fever was caused by the manure heap, the sever, or by both. But such reports are always raque, and of tim present a mass of evidence directly opposed to the conclusions which their authors labored to extablish. That Typhus

or any other continued fiver does not depend upon Kono-miasmata or Malaria, is the distinct arowal of Dr. Baron Howard, who in concluding a report made to the "English For Law Commissioners" to be laid before the Louse of Commons, says, - "It is my deliberate opinion that the vitiation of the atmosphere by the living is much more injurious to the constitution, and much more prolific of disease, than its impregnation with the products of decaying organic matter, and all I have observed in the principal towns and villages, imperatively drives me to the conclusion, that the human miasms generated in overcrowded and poorly ventilated dwellings, are a far more efficient cause of fevers of an infectious wature, than the malaria arising from The most offensive collections of garbage and insufficient severage. In support of this opinion I may add that malignant fevers have more generally prevailed in neighborhoods where the dwellings have been small, over crowded and badly ventilated, although the streets in which they were situated, have been well paved, drained and more free from refuse, than in

neighborhoods where the houses were more thinly occupied, notwithstanding they were surrounded with necesarces giving rice to Malaria." These observations and conclusions are of much value in determining the inocuousness of malana generated by dead organic matter; but they do not furnish proof that the mere products of normal respiration can produce fevers. I may remark in passant, the Dr. Howard appears to have overlooked the wretched circumstances, the many privations, the scantiness and poor quality of the food, and thevery general habits of intemperance of the occupants of those overcrowded and badly ventilated dwellings." I must maintain that putrescent emanations cannot cause Typhus, or any other continued fever. In corroboration of this assertion I quote the following from P. Duchatelet: at Montfaucon there is a general reservoir of all kinds of filthe, and it was to be supposed that if the effluria of putrefactive bodies possessed the power of producing infectious diseases, an unusual amount of fever in its worst forms should be found in this vicinity. This VOIREE

presents a surface of 32,800 yards and receives annually from 230 to 280 cubic yards of the products of the "forse d'aisances", besides which accumulation, the bodies of 12000 horses and of 25000 smaller animals are allowed to not upon its surface. ban the most fertile mind imagine circumstances more favor able for the development of febrile diseases than are here present ed, if the exhalations of filth and decomposing animal and regetable matter ever possess that power? The stench thereof is described as being of the most repulsive character, intolerable within a circumference of 2000 yards, and sometimes including awarea of Hoor yards in its intenso effluria; - whilst some particular winds under certain conditions of the almosphere, have been known to carry it eight miles. a description of the processes through which these materials pass to prepare them for the market, and the aggravating attendants surrounding those employed therein, is foreign to my purpose, it is sufficient for us to Know that Voirie d'Montfaucin contains a concentration of every conceivable nauseating and disqueting putrefactive odor. What there is the health of the persons

inhabiting this neighborhood? most of whom are constantly enveloped in its offensive exhalations. Are they wan, haggard and emaciated? subject to fevers and premature decay? Directly the opposite! They are remarkably healthy, active and vigorous, many of them attain great longevity, and Jyphus or other malignant fevers are seldow known among them. nor do these remarks apply only to the acclimated, fresh workmen who arrive almost daily, suffer no further inconvenience than nausea for a few days. Duchatelet further pays: - "upwards of 2 vo exhumations are annually made in a single Parisian lanetery, and although the bodies are removed in every stage of decomposition, not a single case of Typhus has ever been known to occur amongst the men employed thereat. Before this overwhelming mass of evidence, the trivial and isolated observations upon which the old dogmas of the malarial cause of Jyphus rests, must pass away:

MATTER INTO THE VEINS. Although we think we have

demonstrated that emanations from putrifactive bodies cannot produce disease where the lungs are healthy, yet it does not follow that this matter cannot in any mode operate upon the system. Mr. Saspard experimented whow a dog by injecting fermented cabbage into the jugular wins, the animal died on the fifth day. He presented before death, all the symptoms of Typhus, and the autopsical appearances exactly corresponded with the symptoms. The duodenum, rectum, and small intestines were in flamed; the mucous glands of the rectum were swollen and very distinct, the mesenteric glands were gorged with blood and inflamed, and blacks, thick, ropy har like bile was found in the gall bladder, This single experiment demonstrates the production of Typhus by the injection of putrid matters into the veins, and it also proces that the action of the poison was expended upon the glandular extent, PUTRID MATTER INTRODUCED INTO THE STOMACH A CAUSE OF TYPHUS. We now enter upowas branch of our subject NEW so far as direct observation and experiment are concerned, but fraught with interest and importance. The causes of Typhus have hithorts been sought for

in the above phero, without once supposing that they could exist in the stomach. Overlooking the effects of decomposing matter in rhatorgan they have sought with a geal worthy of a better cause, for the presumed influence of its emanations. Privation has by some writers been deemed the main exciting cause of Typhus, and indirectly it is, for privation, and bad or poor food are inseparable. In proof of the bruth of the assertion at the head of this section, I cite the following from the British and Foreign Guarterly Review" (1843) "Between 5 and 600 persons assembled at a musical festival held at the church of Andelfingen, where, having spent four hours, they withdrew to a temporary outhouse where they dired on cold real, have, and salad with indifferent wire and heer. The meat did not looks good and the hand had sesting a task that many did not partake of it, though most made a hearty meal. Four hundred and fifty of these persons were attacked with disease between the not (the day of the festival) and the 20th, of whom a large number died with marked byphoid symphoms, many on their way home vomited freely and afterwards suffered but little inconvenience, others were attacked between the 5th and 10th days, with nausea, vomiting, diarrhea, pairs in the

limbs and head, rigore, loss of appetite, great thirst, and a very unpleasant coppery baste in the mouth. about the Joh day (of the fever) the epigastric region became extremely hender, and the lowels were constipated in some cases diarrhoxa cance on at this period, and the shoots were dark green and highly offension. Delirium accompanied this stage and all the hyphoid symptoms were fully developed. Between the 14th and 1/th days, slight cough with expectoration ensued, and the patient eventually convalesced. Infatal cases the hyphad symptoms rapidly increased, the abdomen became hympanitic, the strols horribly offensive and mired with dark blood; great prostration, and death closed the scene. The autopsical appearances were, congestion of the membranes of the brain, sero sanguineous infilhation of the lungs, redness of the lower portion of the external coat of the ileum, which, being laid open, presented dark red patches (very friable) on the mucas membrane, and in more advanced cases, patche of ubceration varying in size from a mustard seed to a five cent piece. There can be no room for doubt that these were veritable cases of Typhus (with the exception of those whose symptoms were of a choleroid character.) the symptoms and post morten appearances are fully decisive on that point, and they are, fully

confirmatory of the peroduction of Typhies by unwholesome food, as the "Voirev d' Montfaccon" is of the now-infections nature of the emanations of

pubrescent matter, and there can be no doubt that every sporadio case

has its origin in the food taken by the patient.

THE STOMACH. arabbit, the animal of all others in whom womiting is least easily excited, was fed on feelind lung for handays, giving it a little each

night and morning with a sufficiency of water, and a small quantity of bran, no particular symptoms beyond stupor, were induced, there was no diarrhaa yet the animal died in 36 hours after the first meal.

POST-MORTEM. The stornach contained much semi digested matter, which, on being removed, was covered with a chymous coat for perbably epithelium) which had disappeared in many places from the surface, especially towards the fundus, but there was no unusual redness of that organ: the jejunum was healthy, but slightly injected; the ileum was diseased on its anterior surface over its whole extent, its glands were softened and enlarged, and of as greyish white hinge, - the mucous membrane between them was highly injected, and

of a lived, red, color, and covered with pues, the adjacent absorbents were

filed with pus, Three mesentens glands cut through near the junction of the ileum and cacum were of a purplish red color, enfrom the centre with a wall of a white color about a live in thickness; when there were present with a scalfel, pus estuded. Another contiguous gland was of a purplish red color, without the white wall, and did not contain pus; it was from with a white vessel minning through it. This gland was only inflamed, the gall bladder was filled with a ropy, greenich black, har like tile; the color was dietended with facal matter pos sessing little oder. How there are the precise pathological symptoms of Typhus, and there can be no question when the character of the disease induced, if pathological researches are worthy of credence.

and schiefed of the fact, and are of opinion that the differences of their development are produced by some constitutional peculiarity, aided maybe, by some certains specific conditions of the atmosphere. Typhus and Scarlatina a han epidemic, always prevail together, or at periods succeeding each other at short intervals. Scarlatina generally following Typhus. This is not a casual criminaturals.

almost impossible to say which is the dominant spidemic. Their concurrence is most frequent in the autumnal months, when I plus more commonly acquires the spidemic character. This analogy offers aw intensting field of research.

THE PROBABLE MODE OF ACTION AND COMPOSITION OF THE

VIRUS. But me ther point relating to the production of Syphous remains the considered, and that is, the nature of the materies morter of the affection. We shink with Lung that the arms achoes a ferment, creating in the ultimate mode cutes of the system an action similar to its own, and person corroborated by the well known effects of the introduction of a minute portion of the various lymph into the system. Here the question may area, but how can the introduction of fetres ent matter into the stomach causes fever, since we all know that the gastric fluid is a powerful anterseptic? The fact we promptly admit, and its inferential question is readily answered. In some cases, the gastric fluid may be deficient in quantity, and in others, a larger quantity of the putrid matter may have gained access to the showach, than the

usual amount of gastrie juice, secreted, concorrect. But we would answer the question on another ground, that is, the Known solvent power of the gastric secretion, and it is from the fact of its assimilating agency, that we would meet the inquiry. By its solvent action, the gastrie fluid assimilates the pubrescent matter sufficiently to confer upon it the amount of change needed for absorption and combination with the organic molecules, but not sufficient to neutralize their morbific properties. Hence the production of disease generally, and specially, of Typhus; thus much for the mode of action of the virus: whom its composition we can only offer conjecture, but it is the conjecture fanalogy. We presume then. that the virus of febrile diseases has a strong affinity for Oxygen, as we know the vaccine vives has. It may be a compound of Hydrigen and barbow in some peculiar, and yet unknown state of combination. COMMON DIVISIONS OF TYPHUS. In principal divisions of Typhond fever are recognized, the putrid malignt, and the slow nerrous; to these has others are sometimes added, the inflammatory and the continued. The so called continued fever is a vague and indefinite appellative includeciaces having no resemblance to Typhus. bullen systematized the

labors of his predicessors, and endeavored to prove the identity of continued and intermittent fevers by the decimal exacerbations of the former, but his conclusions were any thing but satisfactory.

INTERMISSIONS IN TYPHUS. It cannot be doubted that there are daily exacerbations in Syphus, may more, it must be admitted that there are intermittent periods of the quartant hype, defined by an augmentation of all the febrile symptoms. These periods are clearly observable at the commencement of the attack and may be detected throught the whole progress of the disease.

Chomel and Louis remarked "that the petechial eneption of pears on or about the fourth day" and Autham says, "The eneption of petechia appears on the fourth or fifth day, and in some cases not until the eleventh or heelfth." Reither the common or petechial mode of Ty phas differs from this law, and it will always be found that the petechia appear on the days of exacerbation. This law of the petechia equally associated Typhus with Scarlations and intermittent fevers, hence the server "Continued Jever" is a missioner.

CLASSIFICATION OF TYPHUS. No may advantageously subdivide

Jephus into let. Typhus Communis. 2d. Typhus Peterhialis and 3rd. Lyphus Hickins. Between the first how the only distinction is the peterhial
emphin, but as this erreption is insome visitations always seen, and in
others, never seen at all, we are justified in making it a line of
demarcation in the division.

NATURE OF TYPHUS HECTICUS. This is the most fatal form by phus can assume, it may commence with symptoms apparently light, vertcersively severe, if slight, the more insidious; if severe, the less controllable by art. It is the "Idynamic Fever" of the French, and the "Low henous Fever of the older writers; the algide Sever is without doubt one of its modifications. He use the term heche in its common senses, and because it is descriptive of that which in all other deseases in included in it, to wit: - an enjeipelatous affection of the mucous membrane of the brucks. The symptoms developed by this modification of fever, are the same as those described as proper to heche. The following from Hugham is to the point: - "The pulse during all this time is quick, weak, and unequal, sometimes fluttering, and sometimes slow for a few munites, (intermitting) and then with a sudden flush in the face, immediately

very quick, and then again surprisingly calmand equal, thus alternating. The heats and chill are uncertain and unequal, sometimes a sudden glow and color in the cheeks, while the tip of the nose and the ears are icy cold, and the forehead is in a cold devery perspiration. The tongue at first is seldow dry or discolored, but sometimes covered with a thin whitish mucus, at length it often appears very dry red and chopped, of the color of Pomegranate Rind. The dellinum is seldone violent but as it were, a confusion of thought and action, with multiring and faltering of speech. Inquently profuse sweats pour out all at once about the eighth or hoelfth day, commonly coldish and clammy on the extremities; very thin strols, the sweats and purging are colliquative and very prostrating Lastly, involuntary exertions and subsulhes kindimino, the preludes to a general convulsion which enaps the thread of life. " The above is a graphic description of Hectic I ever as it presents in the course of any severe disease. Relapses ofter Juphus of the first two modes are generally of the hectic character. DIAGNOSIS BETWEEN TYPHUS HEGTICUS AND MUCO-ENTERITIS. This form of Tykhus is not to be confounded with idio bathic inflammation of

Mu micros membrane of the bowels, a disease often occurring after epidem ic Typhus, but bearing no pathological relation thereto, excepting as regars the mucous membrane. The symptoms are similar, but less severe, and delirium is not so common; in 119 cases reported as occurning in the University College (Gondon 1842) five only presented delinium, and it was dependent on bongestion of the Lungs. In Typhus Hechicus, delirium, or severe pain and weight at the back of the head is a constant symptom. Muco- Enteritis is often exidence and is probably the disease described by Sydenham as the Continued Fever of 1673 - Handes, "the correspondence of their symptoms being complete. The same disease attacking the lungs, is our epidence Influenza.

FINIS.